WHAT IS CLAIMED IS:

1. A system for recovering timing information from a serial data signal, comprising:

a phase interpolator adapted to produce a timing signal having an interpolated phase responsive to a plurality of phase control signals;

a phase controller adapted to derive a rotator control signal based on a phase offset between the received data signal and the timing signal; and

a phase control signal rotator adapted to rotate the plurality of phase control signals and correspondingly the interpolated phase of the timing signal in response to the rotator control signal.

2. The system of claim 1, wherein the phase controller is adapted to cause the phase control signal rotator to rotate the plurality of phase control signals and correspondingly the interpolated phase of the timing signal in a direction to reduce the phase offset between the received data signal and the timing signal.

3. The system of claim 1, wherein the rotator control signal is one of a phase-advance, a phase-retard, and a phase-hold signal, the phase control signal rotator being adapted to:

rotate the plurality of phase controls signals in a first direction to advance the interpolated phase of the timing signal in response to the phase-advance signal;

rotate the plurality of phase controls signals in a second direction to retard the interpolated phase in response to the phase-retard signal; and

prevent the plurality of phase control signals and correspondingly the interpolated phase from rotating in response to the phase-hold signal.

4. The system of claim 3, wherein the phase control signal rotator includes a ring of storage elements each adapted to store one of the plurality of phase control signals, the rotator being adapted to:

concurrently shift in the first direction each of the phase control signals from a present storage element to an adjacent storage element in response to the phase-advance signal; and

concurrently shift in the second direction each of the phase control signals from the present storage element to an adjacent storage element in response to the phase-retard signal.

5. The system of claim 1, wherein each of the plurality of phase control signals is a digital signal.

6. The system of claim 1, wherein the phase control signal rotator is a circular shift register including one of:

a plurality of linearly arranged storage cells each adapted to store a respective one of the plurality of phase control signals; and

a plurality of storage cells arranged in a matrix of rows and columns and linked together to form a ring structure, each of the storage cells being adapted to store a respective one of the plurality of phase control signals.

7. The system of claim 1, wherein the control signal rotator is adapted to cause the phase interpolator to rotate the interpolated phase of the timing signal to one of a plurality of discrete phase values spanning a phase range of 360°.

8. The system of claim 1, wherein the phase controller includes:

a sampler adapted to sample the serial data signal according to the timing signal, thereby producing serial data signal samples;

a phase detector adapted to derive a phase error signal indicative of the phase offset between the timing signal and the serial data signal based on the serial data signal samples; and

a phase error processor adapted to derive the rotator control signal based on the phase error signal.

9. The system of claim 1, wherein the phase controller and the phase control signal rotator are adapted to cause the phase interpolator to rotate the timing signal phase at a rate corresponding to a frequency offset between a frequency of the timing signal and a frequency of the serial data signal so as to frequency synchronize the timing signal to the serial data signal.

10. The system of claim 1, wherein the phase interpolator includes:

a plurality of reference stages adapted to control individual magnitudes of a plurality of component signals having different phases responsive to the plurality of phase control signals; and

a combining node adapted to combine the plurality of component signals into the interpolated timing signal.

11. The system of claim 10, wherein the plurality of component signals includes four component signals having successive phases separated at intervals of 90°.

12. The system of claim 10, wherein the magnitude of at least one of the component signals is varied from a zero magnitude value to a maximum magnitude value in accordance with the plurality of phase control signals.

13. The system of claim 10, wherein the plurality of phase control signals is subdivided into a plurality of signal sets, each of the signal sets being used to control the magnitude of a corresponding one of the plurality of

component signals, the phase rotator including a ring of storage elements subdivided into a plurality of ring segments, each of the ring segments being adapted to store a corresponding one of the plurality of signal sets, whereby each of the ring segments controls the magnitude of a corresponding one of the plurality of component signals.

14. The system of claim 10, wherein the plurality of phase control signals is subdivided into a plurality of signal sets, each of the signal sets being applied to a corresponding one of the plurality of reference stages, each of the plurality of reference stages being adapted to control a corresponding one of the plurality of component signals in response to the corresponding signal sets.

15. A system for recovering timing information from a serial data signal, comprising:

a phase interpolator adapted to produce a timing signal having an interpolated phase in accordance with a plurality of phase control signals;

a sampler adapted to sample the serial data signal according to the timing signal, thereby producing serial data signal samples;

a phase detector adapted to detect a phase offset between the timing signal and the serial data signal based on the serial data signal samples;

an interpolator controller adapted to derive a rotator control signal based on the phase offset; and

a phase control signal rotator adapted to rotate the plurality of phase control signals and correspondingly the interpolated phase of the timing signal so as to reduce the phase offset between the timing signal and the serial data signal.

16. A method of recovering timing information from a serial data signal, comprising:

(a) deriving a timing signal having an interpolated phase in response to a plurality of phase control signals;

(b) deriving a rotator control signal based on a phase offset between the received data signal and the timing signal; and

(c) rotating the plurality of phase control signals and correspondingly the interpolated phase of the timing signal in response to the rotator control signal.

17. The method of claim 16, wherein step (c) comprises rotating the plurality of phase control signals and correspondingly the interpolated phase of the timing signal in a direction to reduce the phase offset between the received data signal and the timing signal.

18. The method of claim 16, wherein the rotator control signal is one of a phase-advance, a phase-retard, and a phase-hold signal, and step (c) comprises:

rotating the plurality of phase controls signals in a first direction to advance the interpolated phase of the timing signal in response to the phase-advance signal;

rotating the plurality of phase controls signals in a second direction to retard the interpolated phase in response to the phase-retard signal; and

preventing the plurality of phase control signals and correspondingly the interpolated phase from rotating in response to the phase-hold signal.

19. The method of claim 16, wherein each of the plurality of phase control signals is a digital signal.

20. The system of claim 16, wherein step (c) comprises rotating the interpolated phase of the timing signal to one of a plurality of discrete phase values spanning a phase range of 360°.

21. The method of claim 16, wherein step (b) comprises:

sampling the serial data signal according to the timing signal, thereby producing serial data signal samples;

deriving a phase error signal indicative of the phase offset between the timing signal and the serial data signal based on the serial data signal samples; and

deriving the rotator control signal based on the phase error signal.

22. The method of claim 16, further comprising rotating the interpolated phase of the timing signal at a rate corresponding to a frequency offset between a frequency of the timing signal and a frequency of the serial data signal so to frequency synchronize the serial data signal to the timing signal.

23. The method of claim 16, wherein step (a) comprises:

controlling individual magnitudes of a plurality of component signals having different phases responsive to the plurality of phase control signals; and

combining the plurality of component signals into the interpolated timing signal.

24. The system of claim 23, wherein said controlling step comprises controlling individual magnitudes of four component signals having successive phases separated at intervals of 90°.

25. The system of claim 23, wherein said controlling step comprises varying the magnitude of at least one of the component signals from a zero magnitude value to a maximum magnitude value in accordance with the plurality of phase control signals.

26. A method of recovering timing information from a serial data signal, comprising:

producing a timing signal having an interpolated phase in accordance with a plurality of phase control signals;

sampling the serial data signal according to the timing signal, thereby producing serial data signal samples;

detecting a phase offset between the timing signal and the serial data signal based on the serial data signal samples;

deriving a rotator control signal based on the phase offset; and

rotating the plurality of phase control signals and correspondingly the interpolated phase of the timing signal in response to the rotator control signal so as to reduce the phase offset between the timing signal and the serial data signal.